Semi-Annual Progress/Technical Report for

Great Lakes Observing System (GLOS) Coordination

Award Number: NA05NOS47311666

Submitted To: Lisa Holmes, NOAA Coastal Services Center

Submitted By: Roger Gauthier, Great Lakes Commission

Reporting Period: June 1 – November 30, 2005

During this reporting period, the Great Lakes Commission (Commission), acting as the Secretariat for GLOS and in conjunction with the GLOS Steering Committee (GLOS-SC), met its obligations under the grant. The information provided within this progress report provides details on how these obligations were met.

Meetings, Workshops and Conferences Conducted or Attended:

Three key meetings were conducted during this reporting period that affected GLOS planning and user needs assessments.

- A GLOS Remote Sensing Subsystem Planning Meeting was conducted on Nov. 4, 2005, in Green Bay, Wis., to review draft plans for CoastWatch product improvements for implementation in 2007-08;

- GLOS Industry Day was conducted on Nov. 15, 2005, in Chicago, Ill., which had 60 attendees. This meeting was focused on defining opportunities for commercial interests nationally and regionally to either be a part of the GLOS development or receive tailor-made products to meet their respective interests; and

- A Regional Data Exchange (RDX) Web Mapping Workshop was conducted on Nov. 18, 2005, in Chicago, Ill., in conjunction with the U.S. Environmental Protection Agency, to promote distributed web mapping applications across the region with emphasis on integrating observation system datasets, monitoring program activities and decision support tools.

In addition to these meetings, the GLOS-SC and Secretariat staff participated in the following events with a focus on coordinating GLOS planning and implementation:

- Michigan State University, Great Lakes Journalism Conference – June 8, 2005, in East Lansing, Mich.;

- American Society of Flood Plain Managers Conference – June 14-15, 2005, in Madison, Wis.;
- International Youth Meeting (4-H) – June 21-22, 2005, in Chatham, Ontario;
- Great Lakes Regional Collaboration Summit I Public Meeting – July 7, 2005, in Duluth, Minn.;
- National Federation of Regional Associations (NFRA) Workshop - July 27-28, 2005, in Washington, D.C.;
- Great Lakes Regional Collaboration Public Meeting – Aug. 1, 2005, in Grand Rapids, Mich.;
- American Society for Photogrammetry and Remote Sensing, Western and Eastern Great Lakes Joint Meeting – Aug. 19, 2005, in Ludington, Mich.;
- Midwest Decision Support Working Group Meeting – Sept. 8, 2005, in Chicago, Ill.;
- International Joint Commission, Upper Great Lakes Plan of Study Public Meeting – Sept. 14, 2005, in Port Huron, Mich.;
- NFRA Meeting – Sept. 19, 2005, in Washington, D.C.;
- Lake St. Clair Conference – Sept. 21-22, 2005, in Wallaceburg, Ontario;
- Great Lakes Commission Annual Meeting – Sept. 27-29, 2005, in Ann Arbor, Mich.;
- International Joint Commission, Council of Great Lakes Research Managers Meeting – Oct. 4-5, 2005, in Chicago, Ill.;
- Great Lakes Regional Collaboration Meeting – Oct. 6-7, 2005, in Rochester, N.Y.;
- Huron to Erie Modeling Workshop – Oct. 17, 2005, in Grosse Ile, Mich.;
- Macomb-St. Clair Inter-County Water Quality Advisory Board Meeting – Oct. 19, 2005, in Mt. Clemens, Mich.;
- New York State Ocean Commission / Pew Commission Workshop – Oct. 24, 2005, in Manhattan, N.Y.;
- OOS-Tech Conference – Oct. 24-26, 2005, in Baltimore, Md.;
- Great Lakes Protection Fund / GLOS Meeting – Oct. 31, 2005, in Chicago, Ill.
- Data Management and Communications (DMAC) Steering Committee Meeting – Nov. 1-3, 2005, in Washington, D.C.;
- U.S. Environmental Protection Agency (USEPA) Great Lakes Remote Sensing Conference – Nov. 1-3, 2005, in Chicago, Ill.; and,
- State of Lake Michigan / Beaches Conference – Nov. 2-3, 2005, in Green Bay, Wis.

Project tasks addressed during the reporting period:

A) Regional Association Establishment, Membership and Staffing

The Commission has continued to coordinate interagency and user involvement to initiate the inaugural GLOS Board of Directors. The GLOS Steering Committee elected to defer standing up the inaugural Board until early 2006 to insure that its bylaws were legally defensible, particularly with regard to issues related to prospective conflicts in loyalty and interest. A key meeting conducted with staff from the Great Lakes Protection Fund highlighted the critical requirements for insuring that liability and accountability details were resolved, particularly since the GLOS Regional Association (GLOS-RA) would be creating real-time products that could be used for navigation purposes. During this period a revised GLOS governance model

and related bylaws were developed, vetted and approved. The alternative GLOS governance model provides protection against most conflicts of loyalty/interest by "firewalling" GLOS members who would gain financial benefit from the endeavor from the fiduciary decisionmaking process. This governance model does, however, provide the GLOS membership active participation in influencing resource allocation priorities. Filing of Articles of Incorporation to create a Non-Profit Corporation in the State of Michigan will occur in early 2006 along with application for 501(c)3 tax-exempt status through the Internal Revenue Service.

Initial drafts of Roles/Responsibilities/Benefits for GLOS membership were generated and discussed within the GLOS Secretariat and GLOS-SC. Revisions to these documents will be made after the inaugural Board is constituted in early 2006 to insure that the Board can endorse the proposed membership structure and dues policies.

The GLOS Secretariat has drafted Memoranda of Understanding/Agreement for federal agencies to become members of the GLOS-RA. Again these documents need to be approved by the inaugural Board prior to submission to respective agency contacts. The GLOS Secretariat will assist the GLOS Board, whenever requested, for follow-on membership solicitation activities.

The Commission has continued to provide staffing for the GLOS Secretariat. Hiring of a full-time GLOS Executive Director, to be responsible for a variety of data, communications, budgetary and administrative staff management, has been deferred to the inaugural GLOS Board when established in early 2006.

B) Enhanced User Needs Assessment

A cursory user needs assessment took place as part of developing the final draft of the GLOS Business Plan. Over this reporting period, the GLOS Secretariat has been conducting a more formal review of user needs in the following categories:

- Water supply protection in southeast Michigan along the St. Clair – Detroit rivers / Lake St. Clair waterway, lakes Huron and Erie Corridor (HEC);
- Overlake remote sensing observations to support monitoring of nutrient and sediment loading; and,
- Commercial navigation needs for improved channel conveyance forecasts for the St. Marys River, upper Great Lakes and the HEC.

Follow-on needs assessments will be outsourced to the Great Lakes Sea Grant Network as part of an outreach campaign. Additional needs assessments for observations to support the massive Great Lakes recreational boating community will be conducted to build upon the information collected in support of the activities described above. Of particular interest are defining prospective improvements to near-shore marine forecasts used by all mariners across the system.

During this reporting period, considerable efforts were expended by GLOS Secretariat staff in supporting the Great Lakes Regional Collaboration (GLRC). The GLRC was created to provide

stakeholder input to the Great Lakes Interagency Task Force established by Presidential Executive Order to assess regional needs for restoring and protecting the Great Lakes. Over 1,500 stakeholders participated in this one-year process to develop a strategic plan for federal, state, local, Native American, and non-governmental organization collaboration over the next five years. One focal area in this effort was the Indicators and Information Strategy Team, which developed a 60-page report appendix that outlined strategic improvements for observation and monitoring programs across the region to support long-term assessments of the success of restoration programs. The GLRC provides an excellent template for GLOS implementation planning, including communications programs, education and outreach.

C) Sub-system Cost-Benefits Assessments

Cost-benefit assessments for proposed GLOS regional observing sub-system improvements have not been conducted during this reporting period, since they will build upon information collected during the detailed needs assessment program outlined above. It is anticipated that the methods developed in the second half of this grant year will be used to support long-term prioritization of resource allocations and funding for education and outreach services.

D) Regional DMAC Initiation

During this reporting period, the GLOS Secretariat established a new web page for the enterprise: www.glos.us. This web page provides comprehensive access to:

- background information on the GLOS initiative, including contact information for the GLOS-SC and GLOS Regional Interest Group (GLOS-RIG), the draft Business Plan, the draft bylaws and membership information;
- Agenda and proceedings of all Steering Committee meetings and conference calls:
- an event calendar, and User Needs Survey area;
- Lake Conditions, including water levels, surface temperatures, meteorologic observations, weekly weather and water level forecasts and links to an experimental buoy in Grand Traverse Bay;
- links to other collaborators including IOOS, RAs and supporting agencies, Great Lakes regional partners and relevant publications;
- Great Lakes news stories affecting observations and monitoring programs across the region; and,
- past GLOS Update articles, including those written during this reporting period.

Further development of this web page will occur during this grant period, particularly to provide links to the web mapping applications being developed under the regional DMAC described herein. The GLOS regional DMAC effort is expected to serve as both an integrating component within the region and as the regional component of a larger IOOS DMAC effort. In general, the GLOS regional DMAC will coordinate and facilitate the distribution of data and information to and from system components, to and from other observing systems, and to end users at all levels.

During this reporting period, the GLOS regional DMAC effort has been focused on the system design requirements for incorporating the following information resources:

- a comprehensive binational (U.S. and Canada) monitoring inventory;
- framework geospatial datasets and detailed geospatial mapping of coastal, open lake and riverine conditions collected under the International Joint Commission's Lake Ontario – St. Lawrence River Study;
- the water level gauging network maintained by NOAA's National Ocean Service, Center for Operational Oceanographic Products and Services;
- air emissions datasets from the eight Great Lakes states and the province of Ontario; and
- the integration of the Great Lakes Information Network (GLIN) as a clearinghouse node in the National Spatial Data Infrastructure (NSDI).

Additional geospatial data resources are being factored into the regional DMAC architecture, including open lake observations made from moorings and remotely sensed observations operated and maintained by universities across the region. This architecture is being implemented piecemeal as datasets become readily available for serving.

As identified in the GLOS Business Plan, all data distributed under the auspices of GLOS would meet IOOS DMAC certification requirements. The GLOS Secretariat has been attending all relevant national DMAC meetings (OOS-Tech, DMAC Steering Committee, etc.) to insure that regional development is being conducted in concordance with rapidly evolving DMAC protocols and certification requirements.

E) Education and Outreach

As GLOS moves into implementation and its Board is established, even greater promotion of GLOS will be necessary to ensure awareness and participation among the region's stakeholders and targeted user communities. This is especially critical in attracting GLOS membership and seeking their input in system design, implementation and product delivery. As mentioned previously, the Great Lakes Sea Grant Network is being subcontracted to assist with these outreach efforts, including conducting surveys and focus groups to assess specific user needs, gaps and deficiencies in existing services; and gathering other input which will contribute to GLOS product research and development. A Memorandum of Agreement (MOA) with the Great Lakes Sea Grant Network specifies the contributions that will be made by each party involved, a list of deliverables, and a timeline for completing the work. Michigan Sea Grant and Ohio Sea Grant are taking the lead on the education and outreach activities, respectively.

GLOS also partnered with the region's Sea Grant programs on a proposal for a Center for Ocean Sciences Education Excellence (COSEE), which was funded by the National Science Foundation in November 2005. The Great Lakes COSEE is the 10th program in the COSEE network and is designed to create dynamic linkages between Great Lakes and ocean research and education with the goal of enhancing scientific literacy and environmental stewardship. One of the program's

key objectives is to improve communication between researchers and 4-10th grade teachers and students while enhancing teacher capabilities for delivering Great Lakes and ocean science education. Over the five-year program, more than 2,000 teachers throughout the region are expected to take part in COSEE Great Lakes activities along with more than 350 researchers. Michigan Sea Grant will lead the curriculum development, focused heavily on educational opportunities afforded by the GLOS data integration efforts. GLOS has begun developing pilot education projects to be pursued in collaboration with COSEE / Sea Grant. Among the planned GLOS-COSEE activities are lake exploration workshops, Great Lakes curriculum enhancement and integration with ocean topics, and interactive learning events linking researchers with educators, students and the public. These small-scale efforts will be thoroughly evaluated to ensure that future educational curricula and delivery methods employed by GLOS are cost-effective, and strategically developed and marketed in subsequent years. A GLOS Education Workshop is being planned for summer 2006.

The GLOS Update e-newsletter is continuing to be created, distributed to an increasingly wide user audience and posted on the GLOS web page. This communiqué was designed to provide GLOS (and larger IOOS) updates to the broad user community, including the GLOS-SC and GLOS-RIG lists and other partners. The GLOS Secretariat has also been providing updates for a recurring section of the Alliance for Coastal Technologies, Great Lakes Regional Chapter newsletter.

F) Coordination of Regional Backbone Observations

Initial efforts under this category during this report period have been focused on working closely with NOAA's Center for Oceanographic Products and Services (CO-OPS) to link delivery of their water level and meteorologic observations to the user community served by GLIN. Under the Regional DMAC initiative, GLOS Secretariat staff has been developing interface methods for ingesting these data into the GLOS web mapping application for distribution in 2006. The GLOS Secretariat staff has also been working with U.S. Geological Survey staff to import stream gauge observations into the web mapping application. Further coordination is planned for early 2006 to engage the Coordinating Committee on Basic Great Lakes Hydraulics and Hydrologic Data, an ad-hoc U.S.- Canadian federal coordinative body, in the GLOS DMAC architectural design.

The GLOS Remote Sensing Subsystem Workshop conducted in November 2005 in Green Bay, Wis., focused on defining near-term improvements to NOAA's Great Lakes CoastWatch products including generation of daily lakewide surface products for chlorophyll, organic solids and surface sediment loads. The CoastWatch Program generates surface temperature maps from daily satellite observations and buoys in the Great Lakes. The Great Lakes Sea Grant Network has enhanced these efforts by developing a highly successful public web page to repackage these maps for use by local mariners and education interests. The CoastWatch system is used extensively (est. 4,000 visits per week) by sports fishing interests to determine the location of temperature gradients where fish may congregate. These types of tools greatly contribute to public knowledge and curiosity about the Great Lakes.

G) Regional Observing Systems Coordination

Efforts of the GLOS Secretariat staff, in conjunction with key GLOS-SC members have been significant during this reporting period in the following strategic areas:

- Integrated observing, monitoring and modeling in the Huron to Erie Corridor – During this reporting period, GLOS Secretariat staff have been working with state, regional and local government agencies in southeast Michigan to coordinate observing system plans, source water protection monitoring activities and regional hydrodynamic modeling development for this critical area within the Great Lakes. All seven IOOS societal objectives would be met by advancing this integration effort. The engagement of national assets in this area has been recognized by local interests and the importance of promoting IOOS has become showcased. A GLOS-hosted workshop to bring together HEC researchers and local interests is planned for March 2006 to discuss data integration efforts.

- Great Lakes Regional Data Exchange (RDX) Conference – GLOS Secretariat staff have been working with a broad stakeholder group to design a conference on Great Lakes remote sensing applications to be conducted in April 2006 in Rochester, N.Y., under the auspices of the Commission-supported RDX initiative. It is anticipated that the GLOS Remote Sensing Sub-system plan will be showcased at this event.

- Coordination of Ship Observations – The Commission has supported the Great Lakes Association of Scientific Ships (GLASS) to plan its annual meeting. There are more than 100 members of the maritime community that convene on an annual basis to coordinate field data collection operations, share information resources and identify community priorities. GLOS is expected to help coordinate data sharing between members of GLASS.

Additional Activities: The GLOS-SC conducted monthly calls during this reporting period to discuss issues about implementing the GLOS Business Plan. Minutes from these calls are posted on the GLOS web site.

Problems encountered: The final draft of the GLOS Business Plan was forwarded to Ocean.US and the NOAA Coastal Services Center in November 2004. To date, the GLOS Secretariat has not received any comments requiring revision. It is anticipated that when the inaugural GLOS Board is constituted and final RA certification requirements are received from Ocean.US, this document will be revised to reflect a more current portrayal of the organization.

Adequate participation of all U.S. federal agencies on the GLOS-SC has not been achieved during this reporting period. Engagement of representatives from NOAA, U.S. Fish and Wildlife Service, U.S. Geological Survey and U.S. Coast Guard has been consistent, but intermittent on